

CLAIMS

What is claimed is:

1. A leadscrew mechanical drive comprising:
a leadscrew having a leadscrew axis and a leadscrew thread with a nonzero leadscrew thread pitch; and
a leadscrew follower structure engaged to the leadscrew, the leadscrew
5 follower structure including
a threaded insert having an insert thread with a nonzero insert thread pitch different from the leadscrew thread pitch, wherein the threaded insert is threadably engaged to the leadscrew thread,
a bearing in which the threaded insert is received and which permits
10 the threaded insert to rotate about an insert axis, wherein the insert axis is angularly rotated from the leadscrew axis,
a bearing support in which the bearing is received, and
a preload structure which biases the insert thread against the leadscrew thread.
2. The leadscrew mechanical drive of claim 1, wherein the insert axis is angularly rotated from the leadscrew axis by an angle of from about 1/4 degree to about 1-1/2 degrees.
3. The leadscrew mechanical drive of claim 1, wherein a leadscrew included thread angle of the leadscrew thread is greater than an insert included thread angle of the insert thread.
4. The leadscrew mechanical drive of claim 1, wherein a difference between the leadscrew thread pitch and the insert thread pitch is no more than about 0.125 percent of the leadscrew thread pitch.
5. The leadscrew mechanical drive of claim 1, wherein the leadscrew

thread pitch is greater than the insert thread pitch.

6. The leadscrew mechanical drive of claim 1, wherein the leadscrew thread pitch is less than the insert thread pitch.

7. The leadscrew mechanical drive of claim 1, wherein the leadscrew comprises a one-piece leadscrew having the leadscrew thread integral with a leadscrew body.

8. The leadscrew mechanical drive of claim 1, wherein the preload structure comprises

a spring that applies a preload force to the insert, and
a restraint that reacts the preload force to restrain a movement of the insert.

9. The leadscrew mechanical drive of claim 1, further including
a motor that drives the leadscrew.

10. The leadscrew mechanical drive of claim 1, wherein the leadscrew mechanical drive has no speed-reducing gearbox therein.

11. A leadscrew mechanical drive comprising:

a leadscrew having a leadscrew axis and a leadscrew thread with a nonzero leadscrew thread pitch; and

5 a leadscrew follower structure engaged to the leadscrew, wherein the leadscrew follower structure includes a first leadscrew follower and a second leadscrew follower, wherein the first leadscrew follower and the second leadscrew follower are substantially identical, and wherein each leadscrew follower includes

10 a threaded insert having an insert thread with a nonzero insert thread pitch different from the leadscrew thread pitch, wherein the threaded insert is threadably engaged to the leadscrew thread,

a bearing in which the threaded insert is received and which permits the threaded insert to rotate about an insert axis, wherein the insert axis is

- angularly rotated from the leadscrew axis,
a bearing support in which the bearing is received, and
15 a preload structure that biases each of the leadscrew followers
against the leadscrew in opposite directions.

12. The leadscrew mechanical drive of claim 11, wherein the insert axis is angularly rotated from the leadscrew axis by an angle of from about 1/4 degree to about 1-1/2 degree.

13. The leadscrew mechanical drive of claim 11, wherein the preload structure comprises
a spring that applies a preload force to the insert, and
a restraint that reacts the preload force to restrain a movement of the insert.

14. The leadscrew mechanical drive of claim 11, wherein the leadscrew thread pitch is greater than the insert thread pitch.

15. The leadscrew mechanical drive of claim 11, wherein the leadscrew thread pitch is less than the insert thread pitch.

16. The leadscrew mechanical drive of claim 11, wherein the leadscrew comprises a one-piece leadscrew having the leadscrew thread integral with a leadscrew body.

17. The leadscrew mechanical drive of claim 11, wherein a leadscrew included thread angle of the leadscrew thread is greater than an insert included thread angle of the insert thread.

18. The leadscrew mechanical drive of claim 11, wherein a difference between the leadscrew thread pitch and the insert thread pitch is no more than about 0.125 percent of the leadscrew thread pitch.

19. The leadscrew mechanical drive of claim 11, further including a synchronous motor that drives the leadscrew.